

Application No. 09/826,458  
Response Dated January 5, 2004  
Office Action of October 3, 2003

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**Remarks/Arguments:****Status of Claims**

Claims 2-16 and 18-26 are pending in the application and have been rejected.

**Claim Rejections**

The Office Action rejects claims 2-7, 10, 11, 18-20, 23, and 24 under 35 U.S.C. § 103(a) as being unpatentable over Eloy (U.S. Patent No. 6,275,045) in view of Wu et al. (Applied Physics Letters, 67: 3523-3525, 1995), Nahata et al. (Applied Physics Letters, 69:2321-2323, 1996), and Cai et al. (Applied Physics Letters, 73:444-446, 1998), and Bromage et al. (U.S. Patent No. 6,239,866). The other pending claims are rejected as unpatentable over the above references further in view of additional references as follows: claims 8, 9, 12, 13, 21, 22, 25, and 26 further in view of Mittleman et al. (U.S. Patent No. 6,078,047), and claims 14-16 further in view of Onstott et al. (U.S. Patent No. 4,896,942). The applicants respectfully traverse all of these rejections.

Independent claim 4 contains the combination of limitations of "a single transceiver device for both emitting and detecting [terahertz frequency electromagnetic] pulses" and "a chopper for modulating the terahertz output pulses." Independent claim 18, drawn to a method for "emitting and detecting a terahertz frequency electromagnetic pulse using a single transceiver device," contains the step of "modulating the terahertz frequency output pulse with a chopper." All of the other claims in the application depend directly or indirectly from claims 4 and 18. Accordingly, because the combinations recited in claims 4 and 18 are not shown in the prior art, all of the claims should be allowed.

The Office Action concedes that the declaration filed 30 June 2003 is "sufficient to overcome the rejection of claims 2, 4-7, 10, 11, 18-20, 23, and 24 based upon Eloy in view of Wu et al., Nahata et al., and Cai et al." The Office Action articulates new grounds of rejection based upon the Bromage reference in combination with the previously cited references. Bromage teaches modulation of THz output pulses with an attenuator. The attenuator "provides

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a rapid decrease in transmission ("turn-on")." Col. 1, lines 20-25. The attenuator's time-dependent transmissivity or "edge function" is utilized in conjunction with a gated photoconductive receiver "to allow one to sample THz pulses with a much finer temporal resolution than is provided by the receiver alone," Col. 2, lines 1-41.

The Office Action cites a combination of the Eloy reference for teaching use of a transceiver generally; the Wu, Nahata, and Cai references for teaching the use of a chopper generally; and the Bromage reference for teaching modulation of THz pulses generally. There is no motivation, however, to combine these references in the specific manner claimed by the applicant, except in hindsight in view of the applicant's application.

It is the **new combination of these limitations** which is claimed and which is nonobvious under the conditions of 35 U.S.C. § 103. "[V]irtually all [inventions] are combinations of old elements." Therefore, an examiner may often find every element of a claimed invention in the prior art. If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue." *In re Rouffet*, 47 USPQ2d 1453, 1457 (Fed. Cir. 1998) (citations omitted) (reversing PTO obviousness rejection based on lack of suggestion or motivation to combine references). "The genius of invention is often a combination of known elements which in hindsight seems preordained. To prevent hindsight invalidation of patent claims, the law requires some 'teaching, suggestion or reason' to combine the cited references." *In re Lee*, 61 USPQ2d 1430 (Fed. Cir. 2002) (vacating Board's rejection of patent claims as obvious because Board failed "to meet the adjudicative standards for review under the Administrative Procedure Act"). *In re Lee* makes clear that "common knowledge and common sense are not the specialized knowledge and expertise contemplated by the Administrative Procedure Act. Conclusory statements . . . do not fulfill the agency's obligation." *Id.* "Even when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the Board must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious." *Id.* The Office Action fails to explain the reason one of ordinary skill in the art would have been motivated to combine the references.

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In order to find a motivation to modify the teachings of Eloy with a chopper as claimed by the applicant, there must be motivation first (1) to modulate the THz pulse with an attenuator per the teachings of Bromage, and then (2) to substitute a chopper as described in Wu, Nahata, and Cai for the attenuator disclosed in Bromage. No motivation can be found in the references for either of these modifications.

First of all, the Eloy reference teaches away from a need for any special signal processing to effectively operate a THz transceiver. See, e.g., col. 4, lines 48-50 ("All that is necessary is that the path traveled by the emitted wave stream is a sufficiently long path so that the stream does not return to the emitter-receiver until after the emission has finished.")(emphasis added). Accordingly, there is no motivation "to use lock-in amplification in the system of Eloy . . . in order to obtain a better SNR and to provide an improved measurement of THz pulses," as stated in the Office Action on page 4. Moreover, even if there were motivation to improve the SNR of the Eloy system generally, there is no suggestion or motivation to modulate the THz pulse with the attenuator disclosed by Bromage, let alone with the applicant's claimed chopper, because nothing in the Bromage reference teaches or suggests any way in which modulation of the THz pulse with an attenuator can be used in conjunction with a transceiver.

Bromage discloses the use of a Si:Ga:As attenuator having specific characteristics. Col. 3, lines 26-42. There is no suggestion in the Bromage reference that a chopper could be substituted for the attenuator so characterized. Similarly, nothing in the Wu, Nahata, or Cai references teaches or suggests that an attenuator and a chopper are interchangeable. Furthermore, Bromage teaches the use of an attenuator on the THz pulse, whereas Wu, Nahata, and Cai teach the use of a chopper on the pump or probe beam. Thus, there is no motivation to combine Bromage with Wu, Nahata, or Cai.

The use of a *chopper* for modulation is important to the applicant's invention. In paragraph 40 of the specification, the applicant notes that "the reflection from the chopper blade automatically serves as a reference marker for the system calibration." There is no teaching in Bromage that an attenuator is capable of providing such a reflection. Furthermore, in the applicant's claimed system, the chopper 22 is positioned between sample 21 and

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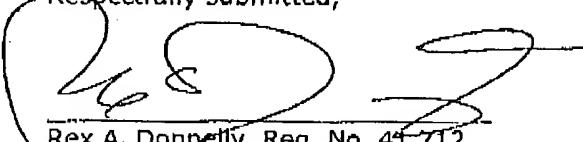
transceiver 18. Therefore, the THz pulse passes through the chopper both before and after it reflects off of sample 21. Bromage does not teach or suggest how an attenuator might function in a transceiver arrangement where the THz pulse would need to pass through the attenuator twice -- once in each direction. This is an additional reason there is no motivation to combine Bromage and Eloy.

Without motivation to combine Bromage with Eloy or with Wu, Nahata, and Cai, and in light of the Office Action's concession that the combination of Eloy with Wu, Nahata, and Cai does not teach the claimed invention, there can be no motivation to combine all of the cited references, except impermissible hindsight in light of the applicant's disclosure. Accordingly, the applicants respectfully submit that claims 4 and 18 are allowable over the cited art, and consequently, all of the pending claims should be allowed at least as dependent upon allowable base claims.

### **Conclusions**

The applicants respectfully submit that this response overcomes each of the rejections set forth in the Office Action and that the application should now be allowed. The Examiner is invited to call the applicants' undersigned representative, however, if any further amendment will expedite the prosecution of the application or if the Examiner has any suggestions or questions concerning the application or the present Response or its enclosures.

Respectfully submitted,



Rex A. Donnelly, Reg. No. 41,712  
Attorney for Applicants

RAD/rad

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P.O. Box 980  
Valley Forge, PA 19482-0980  
(610) 407-0700

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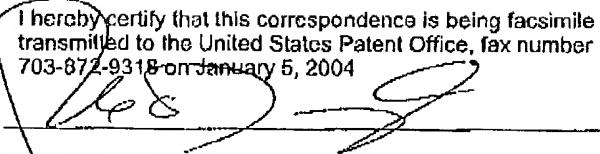
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Rex A. Donnelly

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